

EFFECTS OF TRAFFIC-RELATED AIR POLLUTION ON THE BRAIN IN THE CARDIOVASCULAR HEALTH STUDY

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Background and Aims: Compelling evidence links air pollution to cardiovascular disease. Although the brain is susceptible to pathways mediating these adverse effects, comparatively little is known about the influence of air pollutant exposure on brain health. We will examine traffic-related air pollution effects on risk of dementia and MRI-detected brain abnormalities in the Cardiovascular Health Study (CHS), a large, longitudinal study of coronary heart disease and stroke in older adults, the age-group at greatest risk for dementia.

Methods: The proposed study will include approximately 3,600 men and women aged 65 years and older, living in 4 geographically-diverse communities who were recruited into the CHS between 1989-93 and who participated in annual clinical exams through 1999. Air pollution exposure will be characterized using 1) already-calculated monthly individual estimates of NO₂, CO, O₃, SO₂, and PM₁₀ exposure and 2) residential roadway proximity. Dementia was classified by neurologist/psychologist committee review. Brain infarcts and white matter changes, both of which are associated with elevated risk of cognitive decline and stroke, were measured twice by cerebral MRI. The impact of air pollution on risk of dementia and MRI findings will be evaluated in adjusted Cox proportional hazards and logistic regression models.

Results: 227 participants were classified as having prevalent dementia at study entry, and 480 incident cases were identified during follow-up. Over 30% of subjects had a brain infarct on first scan, and, of the subjects without an infarct at the initial scan who had a second scan, nearly 20% developed an infarct. Approximately 30% of participants who completed both scans experienced worsening white matter grade.

Conclusions: The proposed work is a highly novel, targeted study that takes advantage of an extraordinary resource in the CHS. This study has the potential to provide important knowledge regarding the impact of air pollution on the brain.